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Inventor: Anonymous
Applicant: Eduard Küsters Maschinenfabrik GmbH
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METHOD FOR FINISHING TEXTILE FABRICS

The invention relates to a method in the art as defined in Claim 1.

The term textile fabrics, in this case, refers to woven or knitted fabrics, wherein fibers or threads are linked; but it also includes fleece or fabrics made with threads, and felt, and the like. Fabrics may be individual pieces or in the form of continuous panels.

The term "finishing" is a concept generally known in the art of textile fabrics. It covers any treatment which includes the application of a treatment medium to the already existing fabric, with the medium being a liquid, solid, paste, foam, or gas. The "treatment" may include dyeing, and the accompanying fixing and developing treatments, bleaching, treatments

to obtain wrinkle resistance or moth resistance, and treatment to achieve water resistance.

If treatment media are applied, they interact in a predetermined manner with the substrate, with the interaction, in this case, being influenced by controlling the ambient conditions such as atmospheric humidity, saturation of the vapor atmosphere, and especially, temperature (passing through a vaporizer).

The type of textile fabric and the finishing medium determines the obtainable effect on the fabric and can only be influenced to a limited extent by ambient conditions.

The invention is based on the desire to expand the possibilities of finishing textile fabrics.

The solution of the problem under consideration is defined in Claim 1.

The object of irradiation is to induce a local temperature effect in the finishing medium that has already been applied and, optionally, in the regions of the fabric underneath the medium. In case of the dye, for example, the temperature-increasing effect of the irradiation is to induce local changes in the absorption behavior which results in changes of the dye properties, for example, in pattern-like distributed changes in depth of the

color shade. With other finishing media, the irradiation-induced temperature increases can also be used to induce pattern-like differences in affinity to the fiber or the effectiveness of the respective finishing medium, with the changes being apparent in the finished product.

Irradiation of textile fabrics with lasers is known per se from PCT publication WO 87/03 021. But this case relates to a physical effect on the material of the textile fabric, i.e., localized melting of the fibers to or on in order to effect an increase in their surface area, to welding the fibers of a fleece to reinforce the same or, if a coating is applied to the fabric, to provide small holes in this coating in order to create micro porosity of the same. The fiber, or the material of the fabric is altered physically by the laser beam's melting the material on or to the fabric and, optionally, by heating it further to evaporation.

It is also known to apply a textile woven fabric to a photo layer, to expose it to light in a pattern-like fashion, and to develop the latent image created in this manner in the usual manner. In this case, however, it is not of importance to change the photo layer per se, but to change the interaction of the photo layer with the fiber instead. In this case too, only the the narrow wave range of the visible light is of importance, and expansion to other wavelength ranges have to date not been considered.

Although the power density in this invention is selected in such a way that a sufficient amount of power is applied, for example, to increase the temperature by some ten degrees, the function of the finishing medium nor the physical structure of the fibers is intended to be significantly changed in this case. For example, in an aqueous dye float, the temperature is not to exceed 100°C so that the dye float is still present as a liquid and is absorbed by the fibers in the usual manner but slightly faster at the warmer sites than around them. Temperatures on this order of magnitude are also tolerated by most fiber fabrics without resulting in essential changes in their properties.

The types of irradiation suitable for use in the invention are defined in claims 2 to 5.

In addition to being geometric, the pattern-like irregularity may also encompass intensity (Claim 6) and undulation (Claim 7).

Due to the pattern-like distribution of irregularities in the finished textile fabric if left untreated, images may be produced that cannot be produced in any other manner. Especially important in this case are slight differences in the appearance of adjacent pattern regions. Patterning can be accomplished very simply by directing the beam accordingly without requiring mechanically elaborate and large devices such a printing devices or the like.

An embodiment of the invention is schematically illustrated in the drawing in which:

Fig. 1 is a view of the basic design of a device for implementing the invention.

Fig. 2 is a partial view of a textile fabric finished in accordance with the invention.

According to Fig. 1, a textile fabric in the form of a woven textile panel 1 extends from left to right. After the usual pre-treatment, the liquid dye is allowed to run from the top through an application mechanism 2 onto the fabric. The application mechanism 2 comprises a trough 3 containing the liquid dye into which dips the portion of a roller 4 that rotates in the direction of the arrow. The roller 4 advances the liquid dye on the surface, and the liquid is removed from the surface of the roller by means of a squeegee 5, which is arranged obliquely downward onto the panel and is configured as a run-off surface. A film 7 of the liquid runs off via a squeegee 5 in order to reach the fabric panel 1 from the lower edge 6 of the squeegee 5.

The liquid dye constituting the finishing medium on the fabric panel can be pre-dried or pre-steamed in a device 8 in order to reduce the liquid content.

After the optional device 8 the dyeing substance contained in the dyeing liquid that is applied to the fabric panel 1 is exposed to a laser beam 9 which is produced by a laser 10, with the laser beam 9 being moved in a pattern-like fashion over the surface of the fabric panel 1.

The laser beam has an energy density sufficient to cause the local temperature of the liquid dye applied to the fabric panel 1 to increase by some ten degrees, and this results in a changed interaction between the dye substance and the fibers of the fabric panel 1. These changes do not occur in the non-irradiated regions. The result of this treatment is an irregular pattern over the entire surface. The fabric panel 1 can subsequently pass through the vaporizer 11 in the usual manner.

Fig. 2 is a partial schematic view of the fabric panel 1. The fabric panel 1 comprises a non-irradiated region 12 in which square regions 12, which have been impacted by the laser beam, are distributed in this embodiment. After the finishing process, the irradiated patterned regions 13 are different in appearance from the remaining regions 12 and provide the desired pattern.

The pattern can be further modified by impacting the individual regions 13 by different beam intensities or by different wave lengths.

The physical structure of the fabric panel 1, i.e., the surface quality of the individual fibers and the feel of the woven fabric made thereof are not affected by this laser treatment. What is important is the different local absorption of the applied finishing medium, with the properties otherwise remaining the same.

CLAIMS

1. Method for finishing textile fabrics, wherein a finishing medium is applied to the respective fabric, characterized in that the fabric (1) onto which the finishing medium was applied, is exposed to the effects of radiation in order to increase the temperature in different regions.
2. Method as defined in Claim 1, characterized in that the administered irradiation is corpuscular irradiation.
3. Method as defined in Claim 2, characterized in that the irradiation is electron irradiation.
4. Method as defined in Claim 1, characterized in that the irradiation is electromagnetic irradiation.
5. Method as defined in Claim 4, characterized in that the irradiation is laser irradiation (9).

6. Method as defined in one of Claims 1 to 5, characterized in that the surface of the fabric (1) is irradiated at different sites with different wave lengths.

7. Method as defined in one of Claims 4 to 6 or 10, characterized in that the surface of the fabric (1) is irradiated at different sites with different wave lengths.

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